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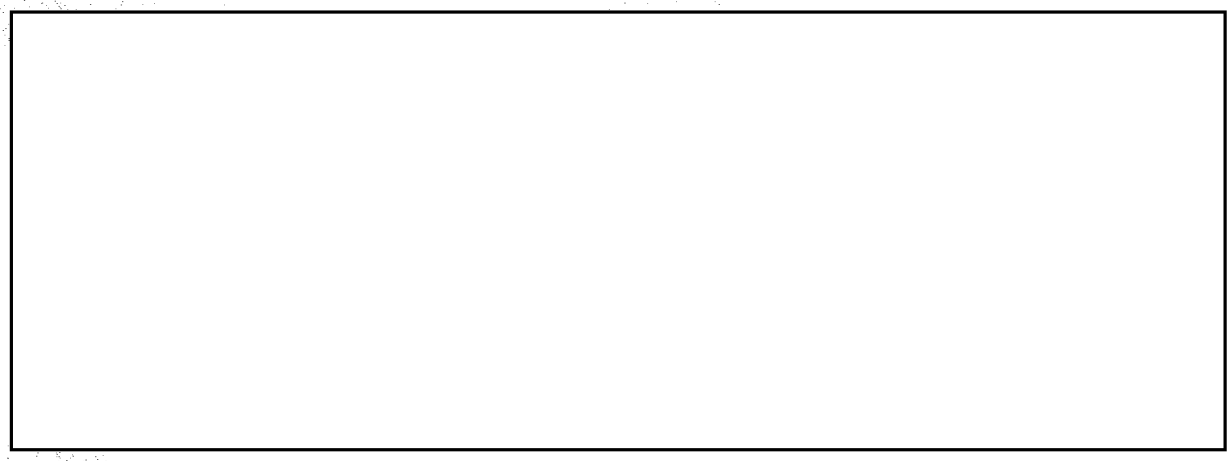

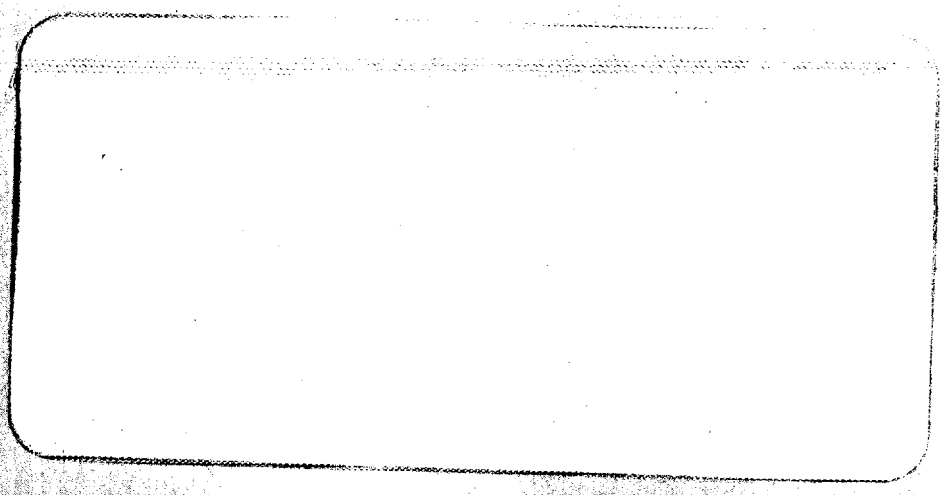

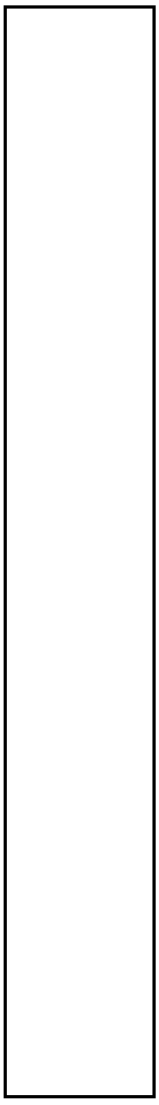

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CHANGE DETECTOR

MAINTENANCE INSTRUCTIONS

1 May 1966

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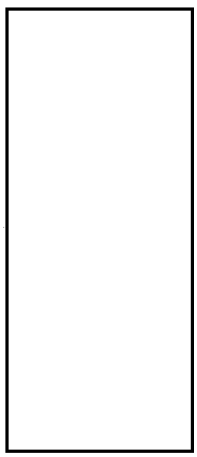

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SECTION I - INTRODUCTION

STATINTL This publication contains basic maintenance and troubleshooting instructions for the Evaluation Model Change Detector manufactured [redacted]

The information contains minimal routine maintenance requirements, general troubleshooting procedures, and procedures for separation of the console into its major subassemblies for transport purposes or easier access to components. A detailed system block diagram is included in the back of this manual. A complete set of circuit schematics is also included, and follows Section III; the complete list is provided in the List of Illustrations.

STATINTL A detailed equipment description or operational procedure is not included in this publication since a thorough discussion of

STATINTL these areas has been provided in [redacted] Final Report, Development of an Evaluation Model Change Detector and [redacted] Change Detector Operation Manual.

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SECTION II - ASSEMBLY-DISASSEMBLY OF CONSOLE UNITS

The instructions included here relate to disassembly of Change Detector Console into major units for ease of transport. Basic reassembly information is also covered.

A. DISASSEMBLY OF CONSOLE UNITS

Disassembly of the change detector is divided into four separate parts; (1) the removal of the control panel chassis, (2) removal of the table, (3) the separation of the registration cabinet from the power supply cabinet, and (4) the separation of the registration cabinet baseplate from the power supply cabinet baseplate.

The change detector is supplied with a 3/8" ratchet and two socket wrenches, one for the baseplate leveling pads and one for the bolts holding the baseplates together.

(1) Removal of Control Panel Chassis

a. If POWER ON light is on, press POWER ON button once to switch power off; then disconnect line cord from wall socket.

b. Remove all screws, except for hinges at top of lid, holding control panel lid to chassis.

c. Lift control panel lid by pulling up on middle joystick and block lid in open position.

d. Disconnect all coax cables coming through the bulkhead and running to circuit boards and coax terminal board.

e. Open access doors to power supplies and pull coax cables through opening in back side of control panel chassis.

f. Disconnect all connectors located directly behind the opening in back of control panel chassis.

g. With control panel lid still open, lift control panel

chassis gently out of opening in table top and carefully feed connecting cables through the opening in the cabinet bulkhead.

h. Rest control panel chassis on table top and close lid.

i. Place control panel chassis aside, being careful cable connectors do not catch on the edges of the opening in table top.

(2) Removal of Table

a. Remove panel screws holding table stand on left end of change detector.

b. Remove panel screws holding rest of table to main cabinet while one man supports right end of table for removal of last two or three screws.

c. Remove four 5/16" countersunk screws located on lower rear edge of table stand. Two on right side of stand and two on left side of stand.

d. Pull table stand forward and free of main cabinet.

e. Feed remaining connecting cable through bulkhead opening in main cabinet and place table aside.

(3) Separation of Two Cabinets

a. Open access doors to power supplies.

b. Pull left monitor out of its slides and latch it in this position.

c. Remove the panel directly behind the power supplies and the panel directly behind the left monitor.

d. Disconnect all [redacted] connectors, [redacted] connectors and coax cables running to the bulkhead from power supply cabinet to registration cabinet.

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e. Remove the three panels on back right-hand side of registration cabinet.

f. Remove the ground cable which is connected by a 3/8" bolt and nut through both bulkheads.

g. Remove the lower front panel on the right side of the registration cabinet.

h. Open registration cabinet doors.

i. Remove all 1/4" bolts and nuts holding the two bulkheads together.

j. Remove lower back left panel on the registration cabinet.

k. There are six leveling pads on the baseplates of the cabinets, four on the registration cabinet and two on the power supply cabinet. Each of these should be turned counterclockwise until they are clear of the floor.

(4) Separation of Baseplates

a. Remove access plates located in the power supply cabinet on the front left corner and the back left corner of the baseplate.

b. Removing the access plates will permit the removal of twelve 1/2" bolts which along with two 1" pins hold the baseplates together. Six bolts can be removed from the front and six from the back.

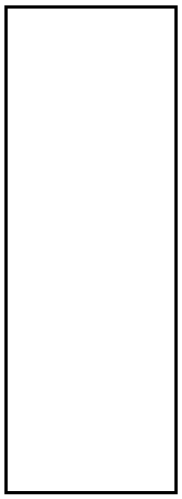
c. With the removal of the 12 1/2" bolts, the 1" pins hold the baseplates together. A small pry bar or heavy screwdriver can be used to pry the baseplates apart. This completes the separation of the two cabinets.

d. For removal to another room or area close the access doors and put panels back on cabinets using two or three screws per panel.

B. ASSEMBLY OF CONSOLE UNITS

To reassemble the change detector, reverse the order of disassembly. For leveling the baseplates leave those panels off which give access to the baseplate leveling pads and level the baseplates after assembly is completed.

It is advisable to use extreme caution when connecting the cables during reassembly. Be positive that these cables are returned to their proper places and all connectors are making good contact.



SECTION III - MAINTENANCE

A. ROUTINE MAINTENANCE

The design of the change detector console is such that the routine maintenance requirements have been kept to a minimum. Depending on the usage of the system, periodic inspection and cleaning of the washable air filter element is required. The filter is located at the intake part of the main system blower at the lower end of the registration assembly cabinet. It can be removed from the outside by loosening the two retaining screws.

The optical components in the registration assembly should be inspected periodically and cleaned with a good grade of lens cleaner if dust has accumulated. Care should be exercised when cleaning any of the front surface mirrors to avoid scratches.

Moving components in the system have either been provided with permanent lubrication or are allowed to run dry. Any attempt at further lubrication is not recommended.

B. SYSTEM TROUBLESHOOTING

Wherever possible the system has been designed to prevent damage to any of the critical components in event of a failure in any associated component or power source. For example, the scanning CRT is provided with protective circuitry to cut off the scanning beam in the event of a failure in the deflection circuitry or power supplies. Moving assemblies which could be damaged by power supply failures or drive circuitry failures have been provided with electrical power disconnect limit switches. If a failure occurs which causes the mechanism to run uncontrollably, the limit switches provide a cut-off of the driving power prior to reaching a mechanical stop.

If the entire system fails to operate upon initiation of the

POWER ON switch, an examination of the main system circuit breaker located at the rear of the display cabinet is in order. This 25-ampere circuit breaker controls all of the power applied to the change detector console. It can be tripped by an overload within the system or by a transient in the power line. If the circuit breaker cannot be reset, an overload within the system is indicated.

The incoming power is fed to the various power sources within the system. These include the +30-Volt dc and -30-Volt dc prime power regulated supplies, +28-Volt dc unregulated supply, and high voltage supply which are accessible from the lower front of the display cabinet. The line voltage regulator, backlight regulator and -125-Volt dc bias supply are accessible from the rear of the display cabinet. With the exception of the line voltage regulator which is connected directly to the main circuit breaker, all the power sources are individually fused. Fuses for each unit are located on the individual panels or assemblies. The two display monitors are also connected directly to the incoming power through the circuit breaker and are individually fused.

A chart showing the major symptoms which would result from a failure in each of the power sources is shown in Table I.

The +30-Volt and -30-Volt regulated power sources supply power to all of the transistorized circuitry within the system. Both power sources are provided with meters to indicate the voltage and current being delivered by each supply. After the system has warmed up, the current drawn from the +30-Volt supply is approximately 6.5 amperes. The -30-Volt supply current is nominally 5.5 amperes. For circuit and supply protection, each supply has been adjusted to be current limited at approximately 7 amperes. In the event of an overload caused by a component failure the maximum current that can be drawn from either supply is 7 amperes. An overload condition can be ascertained by observing the load fault lights

TABLE I

TROUBLESHOOTING POWER FAILURE

Major Symptoms	Possible Trouble
Scanning CRT Inoperative	+30-Volt or -30-Volt Power +28-Volt Power High Voltage Power -125-Volt Power
Registration Mechanisms Inoperative	+30-Volt or -30-Volt Power Line Voltage Regulator
Push Button Lights Inoperative	+28-Volt Power
Backlight Inoperative During Auto Register Mode	Backlight Regulator

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on the two supplies. A determination of the overload cause can be made by locating the malfunction within the system through observation on the inoperable part of the system.

A detailed system block diagram is included in an envelope as Figure 1. The various circuit schematics are included as Figures 2 through 31 (refer to List of Illustrations).

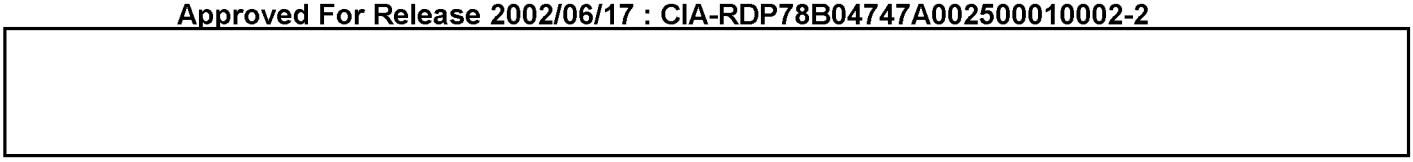
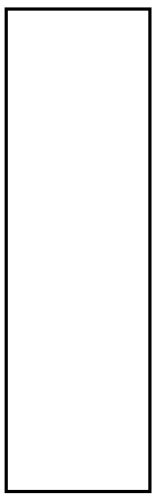


Figure 1. Change Detector System,
Block Diagram

This envelope contains a block diagram of the entire Change Detector System.



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CHANGE DETECTOR

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TENTATIVE EQUIPMENT EVALUATION FORM

A. Please answer either by checking "Yes", "No", or Not Applicable.

	YES	NO	NOT APPLICABLE
1) Is this piece of equipment satisfactory as is?		✓	
2) Does it fulfill a real requirement?		✓	
a) Can you now accomplish a new job?			
b) An old job easier?	✓		
c) An old job faster?	✓		
d) An old job more accurately?	✓		
3) Would its training time outweigh its eventual advantages?	✓		
4) Is equipment comfortable to use?		✓	
a) Seating position comfortable?	✓		
b) Viewing position comfortable?	✓		
5) Does it produce noticeable fatigue?	✓		
a) Eye fatigue?		✓	
b) Muscular fatigue?		✓	
6) Is the intensity of illumination adequate?		✓	
a) Is the color of illumination pleasing?	✓		
b) Is glare a problem?	✓		
7) Is resolution adequate?		✓	
a) Is the magnification range broad enough?	✓		
8) Is the field of view large enough?		✓	
a) Is the image's shape distorted?	✓		
b) Is its color aberrated?		✓	
9) Is the operating temperature low enough?			✓
10) Is this machine of sufficient durability for its potential working environment?	✓		
11) Are the controls satisfactory?	✓		
a) Too hard to reach?			
b) Too hard to identify?		✓	
c) Would you prefer a greater degree of control automation (more buttons rather than handwheels, joysticks, etc.)?		✓	
d) A lesser degree?		✓	
12) Can the same job be performed better on an existing instrument?		✓	
If so, one which one?			✓
13) Is any operation too time-consuming?		✓	
If so, which one(s)?			✓
14) Is this instrument too complex?		✓	
If so, in what way?			✓
15) Is pointing easy enough?	✓		
a) Is the reticle satisfactory?			✓
If not, how not?			✓

B. 1) Please discuss whether or not your objections to this development, if any, are to its total concept or to its specific implementation.

2) What essential improvements would you recommend? What alterations, additions or deletions do you think are necessary?

TENTATIVE EQUIPMENT EVALUATION FORM

A. Please answer either by checking "Yes", "No", or Not Applicable.

	YES	NO	NOT APPLICABLE
1) Is this piece of equipment satisfactory as is?			
2) Does it fulfill a real requirement?			
a) Can you now accomplish a new job?			
b) An old job easier?			
c) An old job faster?			
d) An old job more accurately?			
3) Would its training time outweigh its eventual advantages?			
4) Is equipment comfortable to use?			
a) Seating position comfortable?			
b) Viewing position comfortable?			
5) Does it produce noticeable fatigue?			
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b) Muscular fatigue?			
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a) Is the color of illumination pleasing?			
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a) Too hard to reach?			
b) Too hard to identify?			
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d) A lesser degree?			
12) Can the same job be performed better on an existing instrument?			
If so, one which one?_____			
13) Is any operation too time-consuming?			
If so, which one(s)?_____			
14) Is this instrument too complex?			
If so, in what way?_____			
15) Is pointing easy enough?			
a) Is the reticle satisfactory?			
If not, how not?_____			

B. 1) Please discuss whether or not your objections to this development, if any, are to its total concept or to its specific implementation.

2) What essential improvements would you recommend? What alterations, additions or deletions do you think are necessary?

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